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EMBRYOLOGY.¹

Protoplasmic Continuity.—Prof. Hammar, of Upsala,² emphasizes by figures and description the connection of the cells of the egg of a cleaving sea urchin known to Selenka and others, but hitherto regarded as of no importance. He finds a thin outer layer on the cells of the early and later cleavage cells and even on the cells of the blastula. This layer is seen both in living and in preserved and sectioned material. Its appearance is not that of a membrane but, the author thinks, rather that of an “ectoplasmic” outer part of the protoplasm of the cell. This outer layer is very thin and might be easily overlooked.

It extends continuously over the entire egg and as it seems to be a part of each cell, all the cells are thus held together by a continuous outer pellicle that the author thinks is a protoplasmic layer.

This actual connection of the cells at their outer surfaces, if really a protoplasmic connection, should, as the author insists, be of great importance in the interpretation of the results of experimentation upon echinoderm eggs. He suggests that it offers a suggestion towards the explanation of the interaction believed to exist between the cells of a cleaving egg. Moreover such a connection would make clear why very different results have been obtained after shaking eggs and separating the cells *more or less*.

Cell Studies in Annelid Eggs.—Prof. E. Korschelt, of Marburg,³ has made a most detailed and thorough study of the maturation and fertilization of the eggs of the small polychætous annelid, *Ophryotrocha puerilis* with special reference to the number of chromosomes concerned in cell divisions at different phases of the life history.

Many of the interesting facts described cannot be here referred to, but only some of those that bear upon the question of the value of chromosomes as permanent individuals.

The number of chromosomes found in dividing cells in the adult is *four*, in certain ectodermal, entodermal and mesodermal structures. This same number is found in the cells of the ovary and of the testis, the ancestors of the eggs and sperms. The same number is found in

¹ Edited by E. A. Andrews, Baltimore, Md., to whom abstracts reviews and preliminary notes may be sent.

² Archiv f. mik. Anat., Marz 2, 1896.

³ Zeit. f. wiss. Zool. 60, Dec. 31, 1895, pps. 543–680, pls. 28–34.

the early stages of cleavage and, as a rule, in the later stages and in the blastula, but in the later stages of cleavage and in the blastula there are often cells that contain *eight*.

In the maturation of the egg four chromosomes come out of the net work of the resting nucleus and eventually four go into the first polar body and two into the second. This is brought about as follows: The four very long chromosome loops shorten and divide lengthwise into four cleft rods. When these come to the equatorial region of the first maturation spindle they have again closed together so as to form four simple rods. These separate in pairs and move towards the poles of the spindle without presenting any true mitotic division. The first maturation division is, therefore, a reducing division. Yet the first polar body receives four chromosomes, since the pair that approaches that pole divides, as if opening out where previously split, and thus four rods are formed. The same takes place at the inner pole and four are left for the second maturation spindle. In the second polar body two chromosomes enter by moving away from the other two left in the egg. As it cannot be determined whether the pair entering the second polar body are two halves of one of original ones or halves of two original ones it is not certain whether the second maturation division is a reducing or an equating division.

Though the chromosomes are usually short rods or elongated granules during the maturation division, there are many eggs in which they appear as long, bent or horse-shoe shaped rods.

Some exceptions to the above account must be emphasized as showing the inconstancy of number of chromosomes resulting from lack of synchrony between chromosomal divisions and other phenomena of the cell.

Thus in some cases the first polar body has but *two* chromosomes, since the preceding division of chromosomes is left out. In others *eight* chromosomes are found at the equator of the first polar spindle, formed by a precocious division of the four chromosomes!

Fertilization takes place normally just after the eggs are laid and the sperm enters, while the first maturation spindle is still patent. In abnormal cases fertilization may take place inside the parent which is hermaphrodite and may ripen sperms and eggs simultaneously. Such cases, however, lead to abnormal cleavages and even to fusion of separate eggs, and seem due to some pathological state of the egg.

When the sperm enters the egg radiations are formed behind it, and later in front of it, so that the middle piece of the sperm may be re-

garded as introducing the centrosome or the archoplasm, and it is probable that the sperm revolves through 180°.

The male and the female pronuclei both move toward the centre of the egg and combine, but not till they have both gone through complex and similar changes, including the appearance and dissolution of an enormous nucleolus. The two nuclei finally fuse when each contains *two* long, thread-like chromosomes.

The centrosome or archoplasm of the maturation spindle disappears and that of the sperm divides and furnishes the first cleavage spindle. At the equator of this spindle are found the four chromosomes, two of male and two of female origin. Each splits lengthwise and the eight separate, so that each daughter nucleus obtains two chromosomes of male and two of female origin.

For many important facts not mentioned here the reader is referred to the two hundred remarkably clear figures and the judicial statements found in the original.

PSYCHOLOGY.

A Study in Morbid Psychology, with some reflections.—
(*Continued from page 518*). With regard to the religious (?) experiences of Ansel Bourne, I am not so shallow as to think we can determine in the case of hallucinatory voices whether or no the phenomena are entirely subjective. An attitude of what the late G. J. Romanes has called "pure agnosticism" seems the only philosophical one in these difficult cases.¹ There has arisen a dogmatism in science as narrow and as mischievous as that of the straitest sect amongst theologians.

¹ "No one is entitled to deny the possibility of what may be termed an organ of spiritual discernment. In fact to do so would be to vacate the position of pure agnosticism *in toto*, and this even if there were no objective or strictly scientific evidence in favour of such an organ, such as we have in the lives of the saints, and in a lower degree, in the universality of the religious sentiment." *A Candid Examination of Religion*, p. 149, G. J. Romanes.

"Scientific men, as a class, are quite as dogmatic as the strictest sect of theologians. They professed to be agnostics, at the very time they were egregiously violating that philosophy by their conduct." *Ibid.*, pp. 107-9.